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Meeting on Selected Branches of the
Food Processing Industry in the Middle East
Beirut, 3-8 March 1975

DEVELOPMENT OF THE FOOD INDUSTRY
IN THE MIDDLE EAST COUNTRIES^{1/}

prepared by
the Secretariat of UNIDO

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Regional Meeting on the Development of
Selected Branches of the Food Industry
in Selected Countries of the Middle East

Beirut, Lebanon, 2-8 March 1975

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1. Introduction

There is a world consensus that the availability of food products should be increased in order to up-grade nutritional standards and meet the contingency of acute shortages arising from crises due to circumstances beyond human control, i.e., freak climate conditions, earthquakes and other natural disasters. Even ignoring the aspect of periodic food supply failures, the trend in most developing countries is towards food deficits far exceeding their capacity to import on commercial terms. The gap between food demand and supply is widening and food imports are increasing. The developing countries are facing the problem of financing a very high food import bill which, combined with the consequences of the actual world economic crisis, is substantially aggravating this situation, and will certainly result in a critical world payment crisis if serious measures are not taken. Therefore, all efforts should be concentrated on expanding more rapidly, the world's food production and reducing losses by means of employing modern processing and preservation methods.

The World Food Conference recommended that:

- The first world priority for the next decade must be a substantial and sustained acceleration in the increase of food production.
- A greater proportion of the world's research should be devoted specifically to food production.
- Effort should be directed all over the world towards reducing post-harvest losses of foods, through better processing, storage and distribution.
- The agro-industries should play an important role in both the processing of agricultural products and in the provision of essential inputs.
- The integrated approach to rural development, price policies, co-operative farming, etc., should be widely used to solve the food problems.
- All countries, and primarily the highly industrialized, should promote the advancement of appropriate food production technology and make efforts to promote its transfer, adaptation and dissemination.

2. The Food Processing Industry

The food processing industry plays a fundamental and increasingly important role in the supply of food products. Food processing and agriculture are complementary and increasingly interdependent, in such a way that the identification of where one ends and the other starts, becomes more and more difficult. Not only is its traditional function of conservation and processing of surplus an important role of the food industry, but also important is its role as a tool to increase the use of the raw materials themselves and their by-products in order to make possible the use of materials which otherwise would be polluting factors.

A variety of agricultural raw materials require industrial processing before they can be consumed. A typical crop of this type are soyabbeans, having reached their world-wide importance as a protein food and feed component only through appropriate industrial processing. All oilseed crops, cassava and a variety of grains fall under the same category and last, but not least, palm oil fruits need to be mentioned which have led to the establishment and rapid development of a large-scale agro-industry. The food industry from this viewpoint only, plays a vital role in the international food supply.

In addition, the food industry has another important task to fulfil, namely to up-grade industrial by-products and wastes and turn them into high value food and feed products. The fermentation industry plays a leading role in this field and also the utilization of brans, molasses, slaughterhouse wastes, fish meal and others for the production of feed components and mixed feed as the basis for increasing animal production and finally the supply of meat and other animal products.

In the last three decades, the fruit juice industries have developed at a phenomenal rate. In less than thirty-five years, the commercial output of fruit juices and concentrates increased from almost nothing to about 7,000,000 tons. Only through processing is it possible to preserve and transport such enormous amounts of juices from the production to the consumer centres.

The production of white sugar has been increasing at nearly 4 per cent compound a year from 1957 to 1972, from 40 to 70 million tons and the projected rate of increase is now about 2.7 million tons a year, which corresponds to the output of forty-five large factories, each making 60,000 tons a year.

The statistics indicate that the value added by food processing industries is more than one third as great as the value added by all agricultural production. In a typical industrialized country \$100 worth of food in the retail shop will contain \$50 representing the cost of processing and distribution, against \$20 in agricultural inputs and \$30 of value added on the farm ^{1/}

The new avenues for the increasing of the food supply through industrialization are only just opening up. Actually, great quantities of raw materials are being wasted or not fully utilized. From the production of bananas in countries like Ecuador, about 45 per cent is annually lost. Banana is a very rich carbohydrate and if isolated could perhaps be a raw material to produce bread. The necessary research work is still to be undertaken. Enrichment of traditional foods like caesava, with protein either from other sources like soya or through its own fermentation is a very promising possibility to be explored. The petro-protein also will play an important role as animal feed. These are only a few examples of the importance of the food processing industry in the programmes of increasing the world food supplies and we should mention that the benefits from the food processing industry go far beyond calories and nutrition. Food imports can be reduced or eliminated and food products exported - a two way economic gain. The food processing stimulates greater and more efficient agricultural production. Employment is increased, not only in the factories and the fields, but also, in ancillaries to food processing.

3. Selected Branches of the Food Industry in Some Countries of the Middle East

Although not complete and also not entirely up to date, the following summary gives a general idea of the prevailing situation of

1/ Agricultural Adjustments in Developed Countries, FAO, ERC: 72/3 June 1972

the fruits and vegetables, sugar, vegetable oils and fats and feed industry in some Middle East countries.^{2/}

A. Fruit and Vegetable Industry

As can be seen from Table 1, the fruit and vegetable industry is a very important sector of production in the Middle East countries. In most of them various factories exist and others are being planned. It is a dynamic sector which is being modernized and expanded. The great majority of the factories have diversified production lines. The plants, in general, operate below the installed capacities. This is due primarily to the shortage of raw materials and secondarily, to other problems related to unbalanced equipment and shortage of operators. Several plants were established without a strict plan and they do not have proper lay-outs or homogeneous equipment lines. The production is affected by the quality of the raw materials and their scarcity. The variation of their prices also affects the production costs.

The industry lacks assistance in terms of supporting services such as training, research and development, quality control, etc. In general, the management is not as modern and dynamic as it should be.

It must be pointed out that most of the industry in this sector is government owned. This factor should be considered as a favourable one in respect to the technical assistance to be given.

Another aspect which should be pointed out is the similarity of problems encountered by the industry in the various countries. This also should be considered favourable in relation to technical assistance programmes, since it would be easier to organize such services at country and regional levels.

^{2/} For more details see UNIDO's documents ID/WG. 201/1 to ID/WG. 201/11 of 20 December 1974.

Table 1

FRUIT AND VEGETABLE INDUSTRY

COUNTRY	NUMBER OF PLANTS		PRODUCT DIVERSIFICATION	PROBLEMS						
	Exist. Gov. Priv.	Plan Gov. Priv.		RAW MATERIALS	PACKAGING	LAY-OUT	EQUIPMENT	PERSONNEL	MARKET	OTHERS
PEOPLES DEMOCRATIC REPUBLIC OF YEMEN		1	Tomato paste	Plant will operate only three months per year.	-				no problem	The country imports a great amount of processed fruits and vegetables.
JORDAN	1	1	Mostly tomato paste	Information	not		available		no problem	
LEBANON	2		Very diversified	- shortage - not the proper quality - high and varied prices	- expensive - not the proper quality	not adequate	- not balanced lines - not homogeneous	shortage of skilled trained operators	no problem	- Plants operating below capacity. - lack of quality control. - Lack of research and development. - Lack of standards.
IRAQ	3	12	Very diversified	- shortage - not the proper quality - high and varied prices	- expensive - not the proper quality	not adequate	- not balanced lines - not homogeneous	shortage of skilled trained operators	no problem	- Production costs relatively high. - Lack of research and development - Operation below capacity.

Table 1
(continued)
FRUIT AND VEGETABLE INDUSTRY

COUNTRY	NUMBER OF PLANTS			PRODUCT DIVERSIFICATION	PROBLEMS						
	Exist		Plan		RAW MATERIALS	PACKAGING	LAY-OUT	EQUIPMENT	PERSONNEL	MARKET	OTHERS
	Gov.	Priv.									
SYRIA	5	2		very diversified	- shortage - not the proper quality - high and varied prices	- expensive - not the proper quality	not adequate	- not balanced lines - not homogeneous	shortage of skilled trained operators	no problem	- Lack of research and development. - Lack of standards. - Operation below capacity.

B. Sugar Industry

Table 2 indicates the situation in three Middle East countries with regard to the sugar production. It is an important industry which is also being expanded. However, the region depends to a great degree on imports and actions should be taken to modernize, expand and integrate existing plants and to establish new ones. The existing plants in great part refine imported raw sugar. However, plans for the local production of raw materials and raw sugar should be stimulated. The existing plants present problems which should be removed by means of improving the management, creating standards of quality and enforcing them by law. The managers and operators should receive better training programmes and as a basic goal, measures should be taken to up-grade the use of the available production capacity by means of supplying raw materials on a more steady basis, reducing the breakdowns by means of better repair and maintenance and modernizing the equipment.

In summary, the sugar industry in the Middle East requires multidisciplinary technical assistance which should comprise of the planning of its long term expansion, preparing the necessary feasibility studies and projects, to make the agricultural developments, establishing new plants and the assessment of them in the initial phases of operations, training operators, etc.

Table 2

SUGAR INDUSTRY

COUNTRY	NUMBER OF PLANTS			PRODUCTS	PROBLEMS						
	Exist		Plan		RAW MATERIAL	MAN-AGMENT	PERSONNEL	REPAIR + MAIN-TENANCE	UTILIZ-ATION OF CAPACITY	AGRO-INDUSTRY INTEGRATION	OTHERS
	Gov.	Priv.									
SYRIAN ARAB REPUBLIC	3		1	- production of sugar-beet - refining imported raw sugar	The beet quality should be improved and more strict quality controls enforced.	should be up-graded especially controls	shortage of skilled trained operators	should be up-graded especially the preventive main-tenance	The plants should operate below capacity due to shortage of raw materials, repair and main-tenance and inefficiency of operators.	The plants should be increased in order to better balance the agriculture production and the plant requirements	The equipment of the plants is not homogeneous
LEBANON		4		especially refining imported raw sugar (3 plants) integrated sugar-beet production (1 plant)	The local production of raw materials should be increased and its quality up-graded	should be improved especially grade the utilization of the production capacity	shortage of skilled and trained personnel	should be up-graded and better planned	The poor management is responsible for the low capacity utilization.	should be increased in order to ameliorate the supply of raw material	The Government subsidizes the importing of raw sugar.

Table 2
SUGAR INDUSTRY
(continued)

COUNTRY	NUMBER OF PLANTS				PRODUCTS	PROBLEMS						
	Exist		Plan			RAW MATERIAL	MAN-AGEMENT	PERSONNEL	REPAIR + MAIN-TENANCE	UTILIZ-ATION OF CAPACITY	AGRO-INDUSTRY INTEGRATION	OTHERS
	Gov.	Priv.	Gov.	Priv.								
SAUDI ARABIA			1		Initially refining, later producing raw sugar. The plant will cover the country's needs.							

C. Vegetable Oils, Fats and Feed Industry

This sector also is very important and in great expansion. Most of the plants are of governmental property and the same is true concerning the factories being established or planned. The great majority of the plants operate below their installed capacities and the main reason is the shortage of raw materials. The supply of other inputs such as packaging materials, water and electricity also affects the plant's operations. The industry is very diversified, both with respect to the products and to the type of structure. However, the most important product with respect to quantity is oil from cotton seeds. With regard to the type of plant structure, most of the plants produce and refine oils, generally from imported seeds. However, there are factories which only refine crude oil that is imported. The industry lacks the basic requirements for producing standard quality products. The level of training of the operators is, in general, low. The facilities for performing quality control are inadequate and the raw materials frequently are not of homogeneous quality. Therefore, the industry needs supporting technical assistance aimed at up-grading the overall operations and quality of products. The industry needs to be expanded and modernized. The type of integrated plants should be encouraged since the local production of the required raw materials has been proven to be feasible. Table 3 is a summary of the main aspects of this industrial sector.

Table 3

VEGETABLE OILS. FATS AND FEED INDUSTRY

COUNTRY	NUMBER OF PLANTS				PRODUCTS	PROBLEMS						
	Exist	Plan				RAW MATERIAL	OTHER INPUTS	PERSONNEL	QUALITY	UTILIZATION OF CAPACITY	QUALITY CONTROL	OTHERS
		Cov.	Priv.	Gov.								
LEBANON		12			- olive oil, traditional - oils from oil seeds with the use of modern and more sophisticated methods - production very diversified with about seven different basic raw materials	- mostly imported - prices and quality vary	- packing urgent - need of materials, training water to improve the overall level of electricity skill of the employees. - supply should be improved	There is an urgent need of training to improve the overall level of skill of the employees.	Is not of the high standard that it should be.	The plant works below level, due to the shortage of raw materials.	Not as good and homogeneous as it should be.	- The plants do not have proper technical assistance to operate with efficiency. - There is a lack of scientific knowledge.
JORDAN	No information is available				A small quantity of olive oil is produced in the country.	No information available.	No information available.					

Table 3

VEGETABLE OILS, FATS AND FEED INDUSTRY
(continued)

COUNTRY	NUMBER OF PLANTS			PRODUCTS	PROBLEMS						
	Exist		Plan		P.V. MATERIAL	OTHER INPUTS	PERSONNEL	QUALITY	UTILIZ- ATION OF CAPACITY	QUALITY CONTROL	OTHERS
	Gov.	Priv.									
SYRIAN ARAB REPUBLIC	7		3	- Most important is from cotton seeds, others are from sesame and sunflower - There are a great number of small factories producing olive oil.	The supply of raw materials is improving although not yet sufficient. Storage of raw materials is not adequate.	Packaging and chemicals are imported and their prices are comparatively high.	There is an urgent need of training to improve the overall level of skill of the employees.	There is an urgent need to up-grade quality.	The plants operate below capacity due to the existence of much old equipment requiring more than normal maintenance services. There is frequent shortage of raw materials.	There is an urgent need to establish quality control services.	The management of the plants must be modernized. The expansion of the industry will require a more integrated basis.
SAUDI ARABIA			1		The plant will use sunflower seeds which will grow in the south of the country.						

Table 3

VEGETABLE OILS, FATS AND FEED INDUSTRY
(continued)

COUNTRY	NUMBER OF PLANTS			PRODUCTS	PROBLEMS						
	Exist		Plan		P.W MATERIAL	OTHER INPUTS	PERSONNEL	QUALITY	UTILIZ- ATION OF CAPACITY	QUALITY CONTROL	OTHERS
	Gov.	Priv.									
IRAQ	4		1	- are from cotton, sesame, sunflower, linseed and safflower - most of the raw material used is imported crude oil	- supply of raw material is a great problem. There are shortages and prices and quality variations.	packaging, water and electricity should be improved	There is an urgent need of training facilities	not satisfactory and not homogeneous	Less than 50% of the capacity is used mostly due to shortage of raw materials.	There is a need to improve and to establish more efficient laboratories	There is a great deficiency in research and development and of technical assistance services.

4. Development of the Middle East Food Industry

A. Present Conditions

In the last section of this paper, the main problems affecting the selected branches of the food industry in various countries were mentioned. There is a great similarity in the performance of the plants. Most of them are working below the installed capacity and, the factors determining the below standard efficiency are also very similar. The most important and most frequent cause is the shortage and inadequate supply of raw materials. To this essential factor others are added which have a varied degree of influence and they are related to the training of operators, imbalance of equipment lines, supply of secondary materials, repair and maintenance, etc. The industry in all the countries is going through a process of expansion and also in all of the countries the local supply of foods is not sufficient to satisfy the consumption requirements either in terms of the quantity or the quality of the products. Therefore, the industry urgently requires a comprehensive plan of technical assistance aimed at creating the conditions to optimize the utilization of the available capacity of production and to promote the expansion of the industry according to modern techniques and on an integrated basis.

B. Conditions for Optimizing Operational Performance

Experience shows that a food processing industry, to be successful, must, to the fullest extent possible, be an integrated system of processing agricultural raw materials into final products. Experience has shown also, that the successful implementation of integrated projects requires a multi-disciplinary approach, involving market surveys, feasibility studies, and techno-economic appraisals as well as operational technical assistance and training facilities. There is no doubt that the successful implementation of projects for modernizing and expanding existing industries and for the establishment of new ones is possible only if it is performed sequentially by the same organization. Historically, attempts to divide the responsibility among various organizations or to spread them over extended periods of time have resulted in consistent failure to accomplish actual implementation of the plans. For this reason it is recommended

that national centres for the food industry development be established. Such centres would give to the industry, on a continuous basis, the multi-disciplinary assistance as mentioned above. Such centres would be called Food Engineering Consultancy Services and, the following should be their main characteristics:

C. Food Engineering Consultancy Service

(1) General

National Industrial Consultancy Services, organized by UNIDO, would be established in Middle East countries according to the country's requirements and priorities in respect to implementation of national development plans. The National Industrial Consultancy Service would use local institutes for applied research and development. International experts would be recruited to supplement the local staff of the N.I.C.S. In order to avoid duplication and to ensure optimum utilization of local experts and institutes on a regional basis, the National Industrial Consultancy Services would co-ordinate their work through Regional Industrial Consultancy Services established under UNIDO's guidance. A regional service, enjoying the co-operation and support of local, national centres, could synthesize the activities contributing towards the independent development of domestic skills in the food processing sectors. By providing expertise in food processing and packaging, elaboration of feasibility studies and detailed projects for new and reconstructed food industries, the repair and maintenance of food processing equipment, as well as sanitation materials and processes, including environmental issues such as water treatment and effluent control, the regional and national Consultancy Services could ensure the close co-operation of the production, research, processing and marketing aspects of national food industries at a vital stage in regional development.

UNIDO would, to the maximum extent possible, use National Industrial Consultancy Services to assist in the implementation of technical assistance projects in the food processing industry

(2) Objectives

Long-range objectives

The project's long-range objectives would be to promote the establishment of local food processing industries to raise and maintain the high standard of quality of their products and to increase the production of processed products. The service would provide public and private industries with marketing data as well as technical and economic information required for the establishment of factories. Furthermore, it would establish standards and provide the industries with advice and assistance in exercising control over the quality of their products.

Yet another long-term objective is the establishment of a team of local engineers and economists capable of completing pre-feasibility and feasibility studies for local industries. Hence, systematic on-the-job training of local counterparts through the international experts recruited for the shake-down period will be most essential. A number of fellowships would thus be required.

Immediate Objectives

The immediate objectives of this project would be as follows:

- (a) To identify industrial investment opportunities;
- (b) To formulate industrial projects;
- (c) To prepare market studies for potential processed products for export;
- (d) To prepare technical and economic feasibility studies for the establishment of factories in the country;
- (e) To provide technical consultancy services;
- (f) To promote investment in factories to produce processed products for export and provide potential investors with information on investment regulations;
- (g) To transfer the results of the Food Engineering Consultancy Service's research results to industry;

- (h) To organize the use of the Institute's Service facilities for food quality control and product development research by the industrial community;
- (i) To advise food industry on up-to-date management and technological problems;
- (j) To assist food industry to raise efficiency and quality to required standards;
- (k) To assist food industries to achieve a food international level.

(3) Work Plan

General

The Centre would be created by UNDP and the Government either as an attachment to existing food research centres or as an independent body; however, it is to be a semi-public body, financed to the greater part by the private industries, to whom it provides its services. This will ensure that the service concentrates its activities directly upon assisting the local industries in their development.

The service would be organized in two departments, both of which have a Department Chief. The Department Chiefs will report to the Director who, in turn, will be responsible to the Board of Directors. The two Departments will be:

Economic Department with the programme of:

- Market research including marketing and distribution techniques;
- Collection and analysis of market statistics;
- Establishment of contacts with various industries;
- Export promotion policies;
- Maintenance of liaison with national industry associations;
- Preparation of economic feasibility studies;
- Documentation on all economic aspects of local industries;
- Staff training in economics and financing;
- Book-keeping and accountancy services;
- Financial programming services.

Technology Department with the programme of:

- Processing and product development;
- Technical consultancy services including the evaluation of offers and assistance in the maintenance of equipment, etc.;
- Technical feasibility studies;
- Staff training;
- Transfer of technology;
- Laboratory services for quality control, etc.;
- Standardization;
- Production programming;
- Plant-level assistance;
- Packaging of food products;
- Technical management;
- Training the staff of food industry clients;
- Repair and maintenance of control instruments for food industry;
- Sanitation techniques;
- Plant installation and operation service.

5. Conclusions

The previous chapters of this paper contain a series of facts and considerations of a preliminary nature which indicate that the Middle East Countries have the basic conditions to enable them to contribute towards the targets of increasing food production as recommended by the World Food Conference. It was shown that the food processing industry is a dynamic sector in most of the countries, and it was also shown that there is a great potential for increasing the use of the available processing capacity and to expand it. The production of agricultural raw materials, which proved to be feasible in most of the countries is being expanded in order to solve the industry's actual basic problem.

There is an urgent need to assist the industry to ameliorate its efficiency in using the equipment and producing better quality products. It was shown that the problems facing the industry are very similar in all the countries. Therefore, it is clearly indicated that a systematic approach towards the industry's modernization and expansion is required and that co-operation between the

various countries is possible and desirable, since it would contribute to a better use of scarce resources for planning, training, performing research and development work, etc. It was indicated that a multi-disciplinary approach of technical assistance to be supplied by Engineering Consultancy Services, would be the most adequate way of rationally promoting the food industry development and that the National Consultancy Services should co-ordinate at regional level. It must be pointed out that a project to establish in Iraq, a Centre for the Food Processing Industry Development, is under implementation. The structure and objectives of this Centre follow entirely along the lines recommended in this paper. Therefore, we recommend that the possibility be explored of having this Centre as a model for others to be established in other countries and also, if possible, to expand the Iraq's Centre's structure and activities as to make it a regional nucleus of technical assistance in the field of the food processing industry.